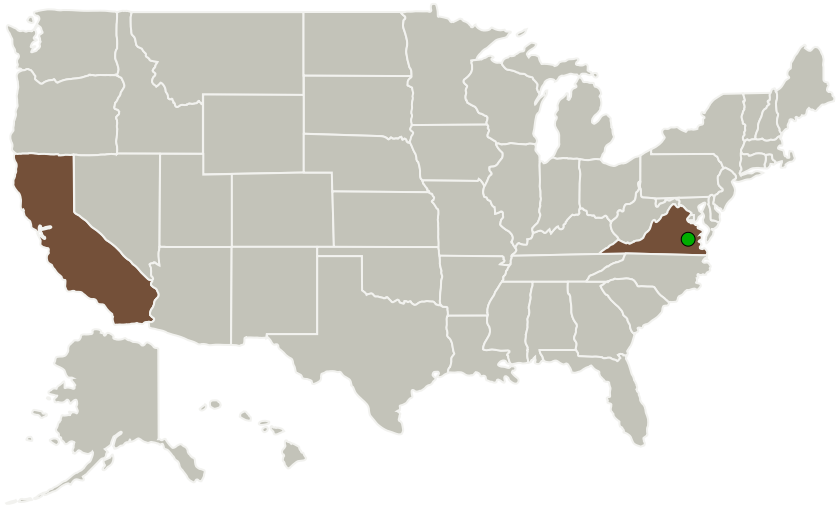
Adjoint Techniques and Acoustic Three Zone Method for the Accurate Design of Low Boom Maneuvers (ATAtZM-DLBM), Phase I

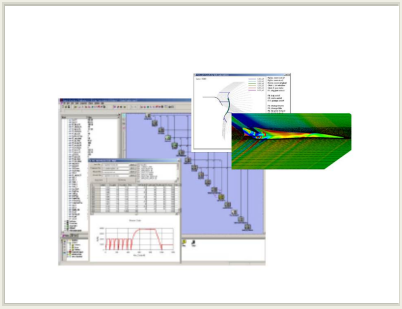
Completed Technology Project (2015 - 2015)

Project Introduction

Under this collaborative effort, Creative Aero Engineering Solutions (CAES) and its partner, Wyle Laboratories, will integrate within our MDO framework the latest development of the three zone method, which is expected to eliminate the need for far-field results beyond 25 spans that typical Sonic-Boom prediction two-zone methods currently use. We will use the adjoint solution of the near-field pressure functional of the flowfield (more specifically sonic boom related functionals) to create new design variables, which will better characterize the design space more accurately and allow for more efficient low-boom configuration design. Subsequently, a similar methodology can be utilized for trajectory optimization (i.e. avoidance of focused booms at certain locations) during climb and descent of typical supersonic aircraft. We will use a different set of variables for such purposes (i.e. control surface deflections/thrust schedules). During Phase I we will establish the feasibility of the three zone approach within our MDO framework and verify the functionality of the design variables. Under Phase II, we will apply the new methodology to a NASA Low Boom configuration.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Creative Aero Engineering Solutions	Lead Organization	Industry Women-Owned Small Business (WOSB)	Long Beach, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

June 2015: Project Start

December 2015: Closed out

Closeout Summary: Adjoint Techniques and Acoustic Three Zone Method for t he Accurate Design of Low Boom Maneuvers (ATAtZM-DLBM), Phase I Project I mage

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138777)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creative Aero Engineering Solutions

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

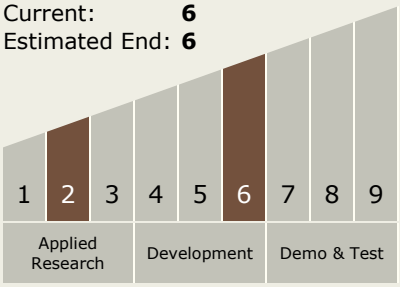
Carlos Torrez

Principal Investigator:

Alan Arslan

Technology Maturity (TRL)

Start: **2**
Current: **6**
Estimated End: **6**



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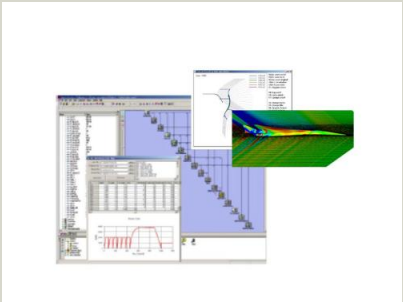
Images



Briefing Chart Image
Adjoint Techniques and Acoustic Three Zone Method for the Accurate Design of Low Boom Maneuvers (ATAtZM-DLBM), Phase I
(https://techport.nasa.gov/image/137178)

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.4 Aeroacoustics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System